CHI MEI
OPTOELECTRONICS CORP.

Issued Date: Feb. 3, 2010
Model No.: M156B3-LA1

Tentative

TFT LCD Tentative Specification

MODEL NO.: M156B3-LA1

Customer: _____

Approved by: _____

Note:

核准時間	部門	審核	角色	投票
2010-02-10 13:20:07	MTR 產品管理處	吳 2010.02.10 柏 勳	Director	Accept

Version 0.0

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	Date	Section	Description
Ver. 0.0	Feb.3, 10	-	M156B3-LA1 Tentative Specifications was first issued.

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1. GENERAL DESCRIPTION

1.1 OVERVIEW

M156B3-LA1 is a 15.6" wide TFT Liquid Crystal Display module with white LED Backlight unit and 30 pins 1ch-LVDS interface. This module supports 1366 x 768 WXGA mode and can display 16.7M colors. The converter module for Backlight is not built in.

1.2 FEATURES

- Contrast ratio 500:1

- Response time 8ms.

- WXGA (1366 x 768 pixels) resolution.

- DE (Data Enable) only mode.

- LVDS (Low Voltage Differential Signaling) interface.

- RoHS compliance.

- White LED Backlight Unit

- Low power consumption

1.3 APPLICATION

- TFT LCD Monitor

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	344.232(H) × 193.536(V) (15.6" diagonal)	mm	(1)
Bezel Opening Area	347.5(H)x196.8(V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch	0.252 (H) x 0.252 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7M	color	-
Color saturation	(65) %NTSC (typ.)	-	-
Surface Treatment	AG type, 3H hard coating, Haze 25	-	-
Module Power Consumption	(8.002)	Watt	(2)

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	363.3	363.8	364.3	mm	(1)
	Vertical(V)	215.4	215.9	216.4	mm	
	Depth(D)	10.4	10.9	11.6	mm	
Weight		-	1061	1081	g	-
I/F connector mounting position		The mounting inclination of the connector makes the screen center within ±0.5 mm as the horizontal.				

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) Please refer to the section 3.1 & 3.2 & 3.3 for more information of power consumption.

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2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)
Shock (Non-Operating)	S_{NOP}	-	50	G	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.5	G	(4), (5)

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel display surface area should be 0 ºC Min. and 60 ºC Max.
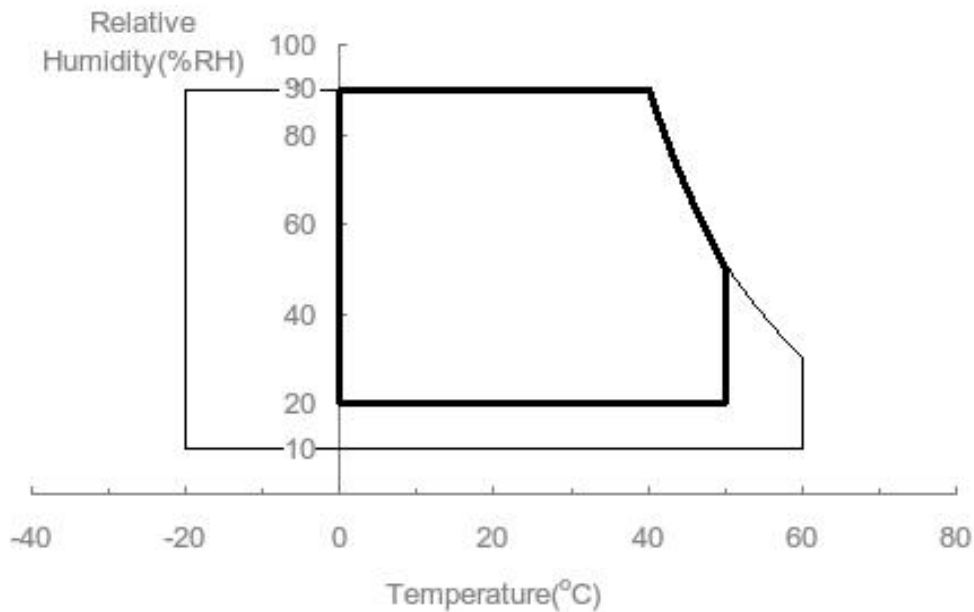
Note (3) 50G,11ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

At Room Temperature

LCD Module

Side Mount Fixing Screw   Side Mount Fixing Screw

Stage

Gap=3~5mm   Bracket

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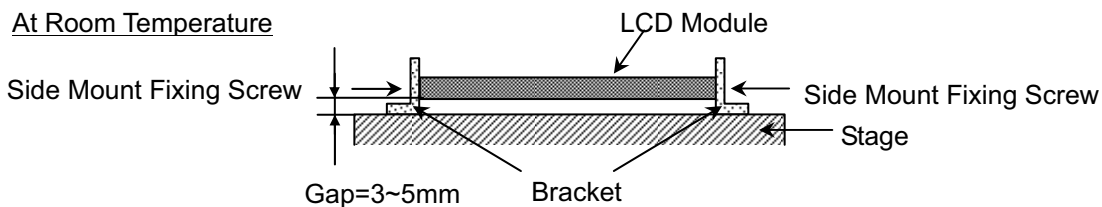
2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	+6.0	V	(1)
Logic Input Voltage	Vlogic	-0.3	+2.8	V	

Note (1) Permanent damage might occur if the module is operated at conditions exceeding the maximum values.

2.2.2 BACK LIGHT UNIT

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Forward Current Per Input Pin	I_F	0	20	30	mA	(1), (2) Duty=100%
LED Reverse Voltage Per Input Pin	V_R	---	---	(60)	V	
Power Dissipation Per Input Pin	P_D	---	---	(1.224)	W	

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2) Specified values are for input pin of LED light bar at Ta=25±2 ℃ (Refer to 3.2 and 3.3 for further information).

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3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE
Ta = 25 ± 2 ℃

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	4.5	5.0	5.5	V	-
Ripple Voltage		V_{RP}	-	-	100	mV	-
Rush Current		I_{RUSH}	-	0.84	2	A	(2)
Power Supply Current	White	-	-	0.31	0.37	A	(3)a
	Black	-	-	0.38	0.46	A	(3)b
	Vertical Stripe	-	-	0.41	0.5	A	(3)c
Power Consumption		P_{LCD}	-	2.05	2.5	watt	(4)
LVDS differential input voltage		Vid	200	-	600	mV	(5)
LVDS differential input voltage		Vid	100	-	600	mV	
LVDS common input voltage		Vic	-	0.8	-	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:
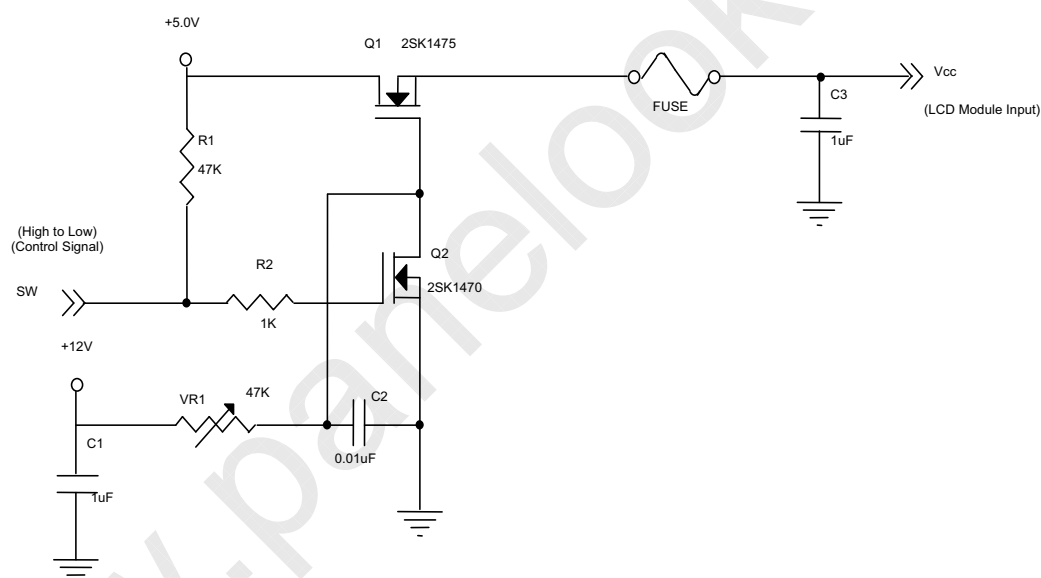
Vcc rising time is 470μs

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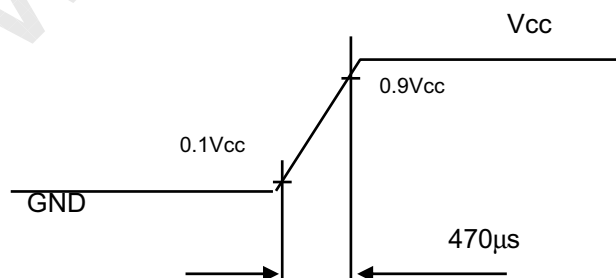
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Note (3) The specified power supply current is under the conditions at Vcc = 5.0 V, Ta = 25 ± 2 ºC, f_v = 60
Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

Active Area

b. Black Pattern

Active Area

c. Vertical Stripe Pattern

Active Area

R	G	B	R	G	B
B	R	G	B	R	G	B	R
B	R	G	B	R	G	B	R
R	G	B	R	G	B
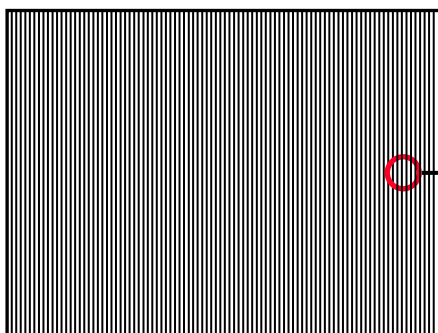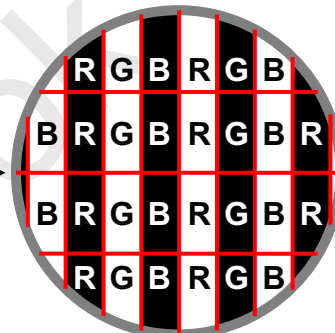
Note(4)   The power consumption is specified at the pattern with the maximum current.

Note (5) VID waveform condition:

Single-End

LVDS Vin N

LVDS Vin P

Vid

Vic

GND

Differential Signal

0V

Vid

Vid

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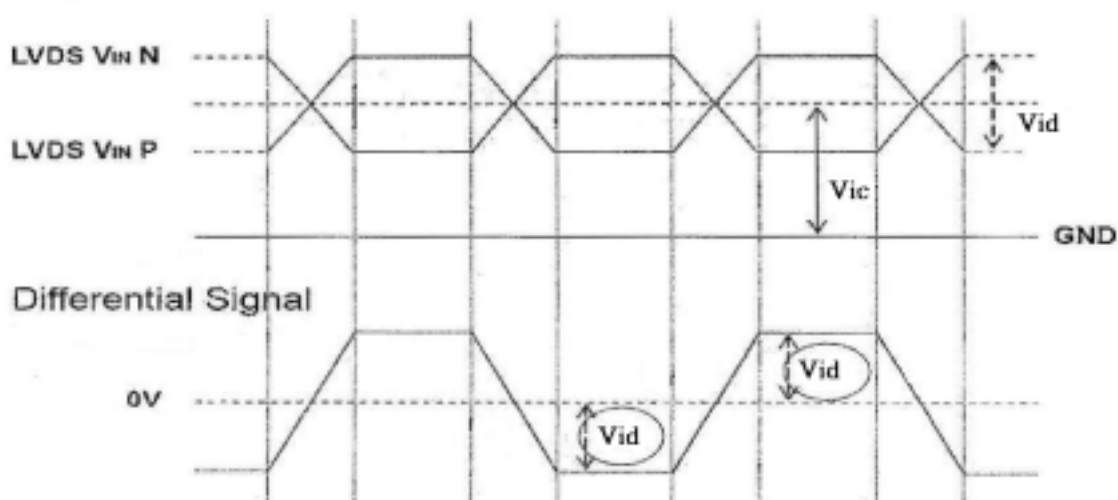
3.2 Vcc Power Dip Condition:
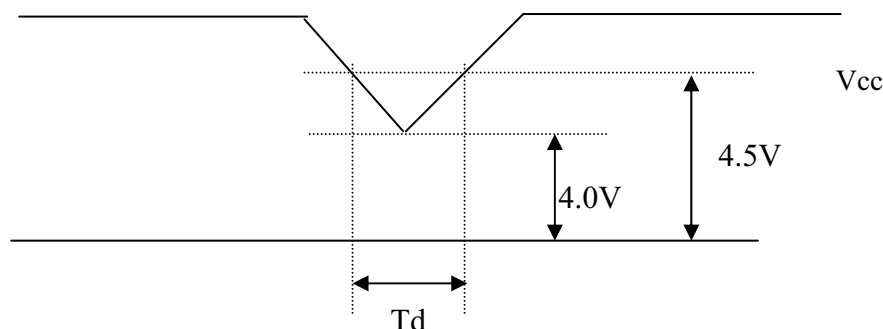
Dip condition: $4.0V \le Vcc \le 4.5V, Td \le 20ms$

3.3 BACKLIGHT UNIT   Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED light bar Input Voltage	V_O	(33.6)	(37.2)	(40.8)	V_{DC}	(1), Duty=100%, IPIN=20mA
LED light bar Lamp Current	I_{pin}	--	(20)	(30)	mA_{DC}	(1), (2) Duty=100%
LED Life Time	L_{BL}	25000	30000	---	Hrs	(3)
Power Consumption	P_O	---	(5.952)	---	W	(1) Duty=100%, IPIN=20mA

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2) $P_{BL} = I_{PIN} \times V_{PIN} \times (8)$ input pins , LED light bar circuit is (12)Series, (8)Parallel.

Note (3) The lifetime of LED is defined as the time when LED packages continue to operate under the conditions at Ta = 25 ±2 ℃ and I= (20)mA (per chip) until the brightness becomes $\le$ 50% of its original value.

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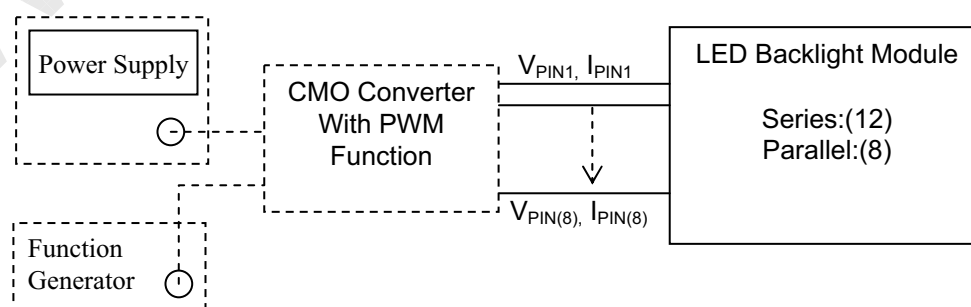
3.4 LIGHTBAR Connector Pin Assignment

3.4.1 Connector type

Iutput connector: 7083K-F12N-00L (Entery)

3.4.2 Input connector pin assignment: CN1

Input connector pin assignment: CN1

Input connector CN1		Comments
(vendor) (Entery)	(type) 7083K-F12N-00L	
Pin	Function	
1	LED1	LED1 negative polarity
2	LED2	LED1 negative polarity
3	LED3	LED1 negative polarity
4	LED4	LED1 negative polarity
5	NC	No connect
6	VLED (35V)	Input voltage Power Supply + (35V.typ)
7	VLED (35V)	Input voltage Power Supply + (35V.typ)
8	NC	No connect
9	LED5	LED1 negative polarity
10	LED6	LED1 negative polarity
11	LED7	LED1 negative polarity
12	LED8	LED5 negative polarity

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4. BLOCK DIAGRAM

4.1 TFT LCD MODULE

4.2 BACKLIGHT UNIT

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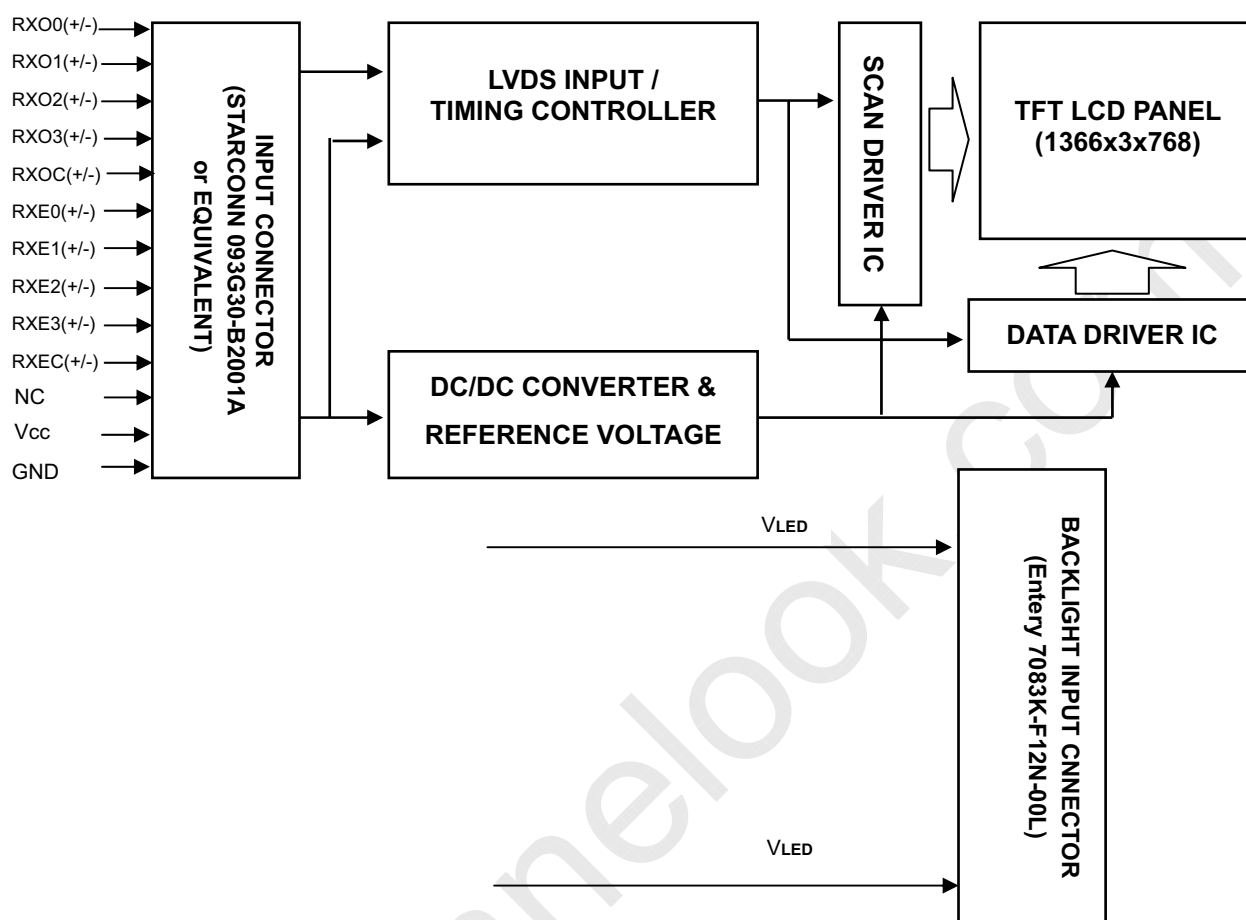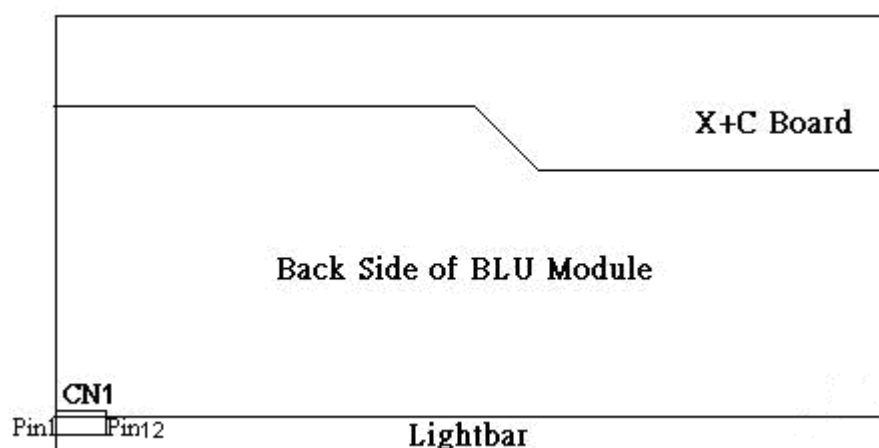
5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Name	Description
1	NC	Not connection, this pin should be open.
2	NC	Not connection, this pin should be open.
3	NC	Not connection, this pin should be open.
4	GND	Ground
5	RX0-	Negative LVDS differential data input. Channel 0
6	RX0+	Positive LVDS differential data input. Channel 0
7	GND	Ground
8	RX1-	Negative LVDS differential data input. Channel 1
9	RX1+	Positive LVDS differential data input. Channel 1
10	GND	Ground
11	RX2-	Negative LVDS differential data input. Channel 2
12	RX2+	Positive LVDS differential data input. Channel 2
13	GND	Ground
14	RXCLK-	Negative LVDS differential clock input.
15	RXCLK+	Positive LVDS differential clock input.
16	GND	Ground
17	RX3-	Negative LVDS differential data input. Channel 3
18	RX3+	Positive LVDS differential data input. Channel 3
19	GND	Ground
20	NC	Not connection, this pin should be open.
21	NC	Not connection, this pin should be open.
22	AGMODE	AGMODE should be tied to ground or open.
23	GND	Ground
24	GND	Ground
25	GND	Ground
26	Vcc	+5.0V power supply
27	Vcc	+5.0V power supply
28	Vcc	+5.0V power supply
29	Vcc	+5.0V power supply
30	Vcc	+5.0V power supply

Note (1) Connector Part No.: STARCONN 093G30-B2001A or equivalent

Note (2) Mating Wire Cable Connector Part No.: FI-X30H(JAE) or FI-X30HL(JAE)

Note (3) Mating FFC Cable Connector Part No.: 217007-013001 (P-TWO) or JF05X030-1 (JAE)

Note (4) The first pixel is odd.

Note (5) Input signal of even and odd clock should be the same timing.

5.2 LVDS DATA MAPPING TABLE

LVDS Channel 0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	G0	R5	R4	R3	R2	R1	R0
LVDS Channel 1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	B1	B0	G5	G4	G3	G2	G1
LVDS Channel 2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	B5	B4	B3	B2
LVDS Channel 3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	B7	B6	G7	G6	R7	R6

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5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Red R7	R6	R5	R4	R3	R2	R1	R0	Green R7	R6	G5	G4	G3	G2	G1	G0	Blue R7	R6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

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6. INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	Fc	60	76	96	MHz	-
	Period	Tc		13		ns	
	Input cycle to cycle jitter	T_{rcl}	-20*Tc		20*Tc	ps	(1)
	Spread spectrum modulation range	F_{clkin_mod}	FC*98%		FC*102%	MHz	(2)
	Spread spectrum modulation frequency	F_{SSM}			200	KHz	
	High Time	Tch	-	4/7	-	Tc	-
	Low Time	Tcl	-	3/7	-	Tc	-
LVDS Data	Setup Time	Tlvs	600	-	-	ps	(3)
	Hold Time	Tlvh	600	-	-	ps	
Vertical Active Display Term	Frame Rate	Fr	50	60	76	Hz	Tv=Tvd+Tvb
	Total	Tv	800	806	815	Th	-
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	Tv-Tvd	38	Tv-Tvd	Th	-
Horizontal Active Display Term	Total	Th	1500	1560	1570	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	-
	Blank	Thb	Th-Thd	194	Th-Thd	Tc	-

Note: Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.
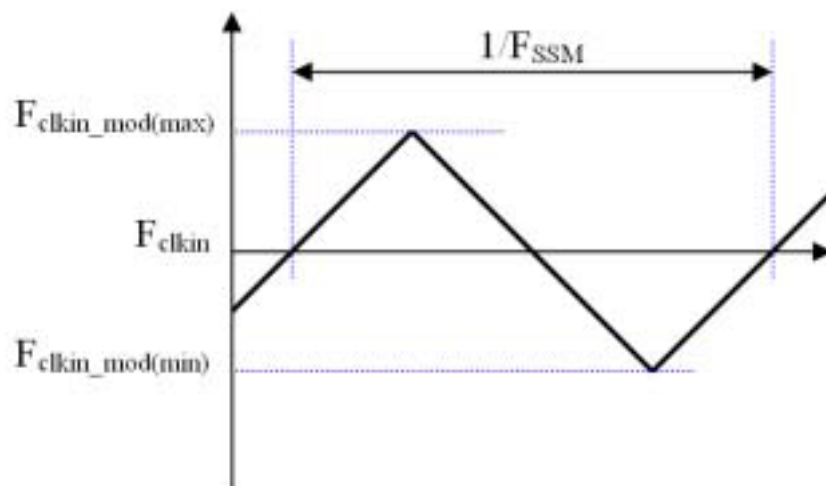
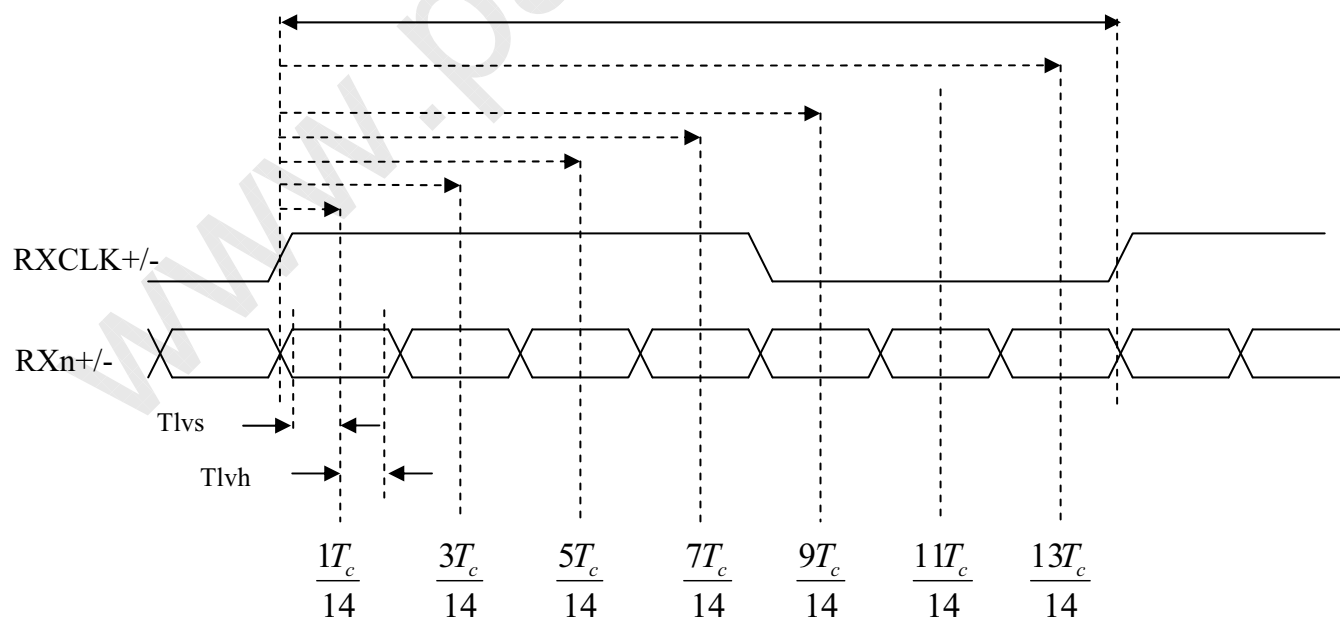### INPUT SIGNAL TIMING DIAGRAM

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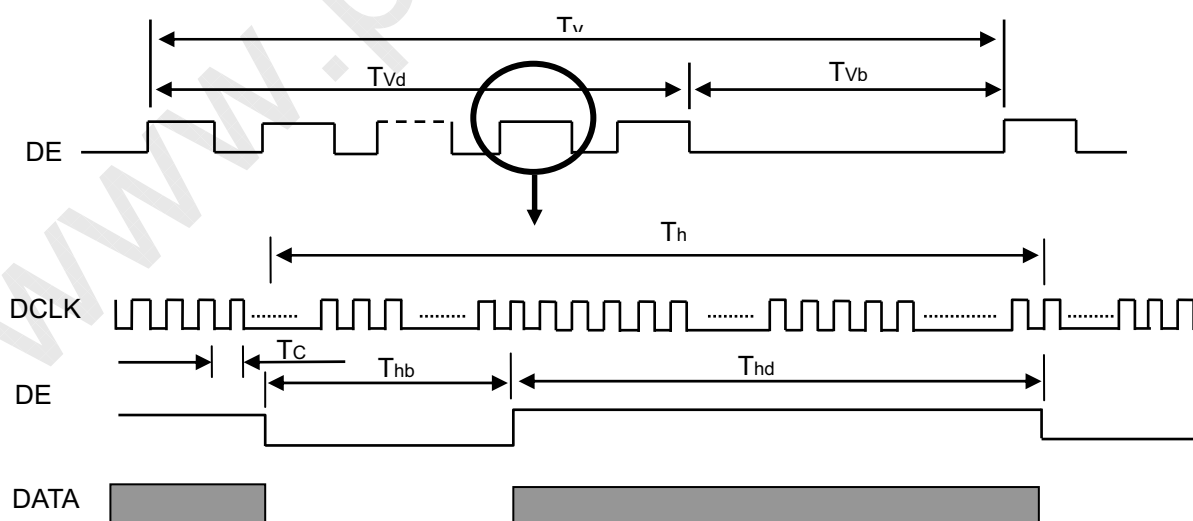
Note (1) The input clock cycle-to-cycle jitter is defined as below figures. Trcl = I T$_1$ – TI
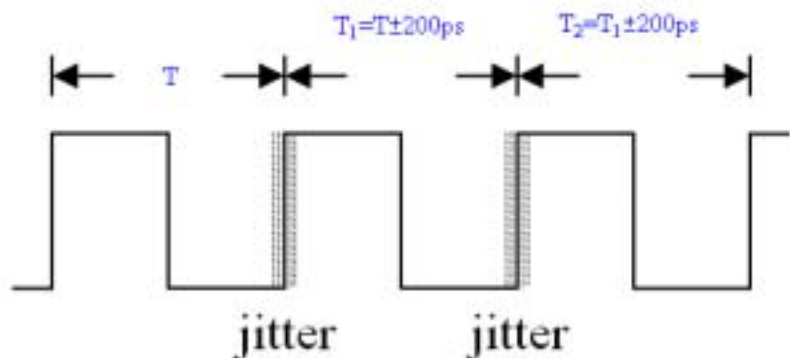
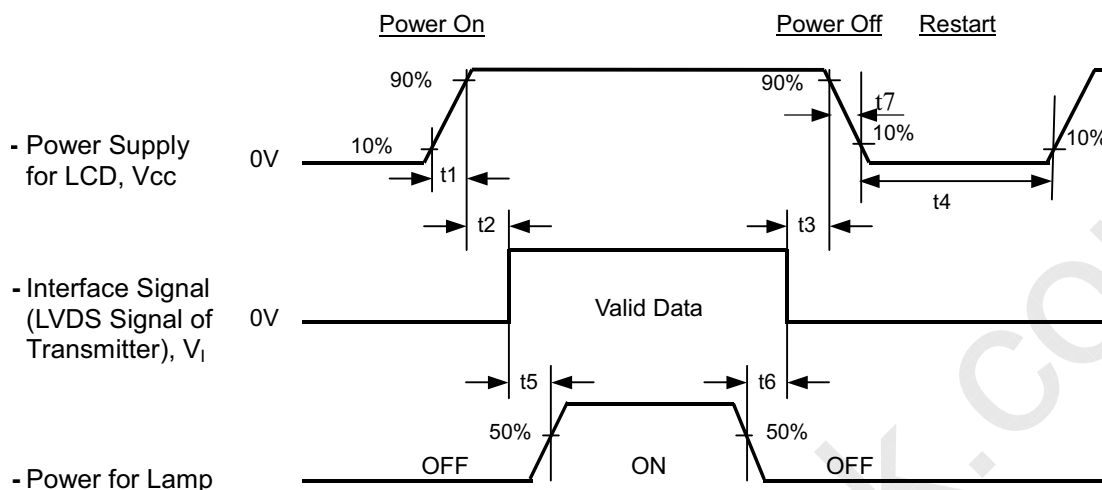Note (2) The SSCG (Spread spectrum clock generator) is defined as below figures

Note (3) The LVDS timing diagram and setup/hold time is defined and showing as the following figures

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6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.

Timing Specifications:

$0.5 < t1 \leqq 10$ msec

$0 < t2 \leqq 50$ msec

$0 < t3 \leqq 50$ msec

$t4 \geqq 500$ msec

$t5 \geqq 450$ msec

$t6 \geqq 90$ msec

$5 \leqq t7 \leqq 100$ msec

Note.

(1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.

(2) When the backlight turns on before the LCD operation of the LCD turns off, the display may momentarily become abnormal screen.

(3) In case of Vcc = off level, please keep the level of input signals on the low or keep a high impedance.

(4) t4 should be measured after the module has been fully discharged between power of and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

(6) CMO won't take any responsibility for the products which are damaged by the customers not following the Power Sequence.

(7) There might be slight electronic noise when LCD is turned off (even backlight unit is also off). To avoid this symptom, we suggest "Vcc falling timing" to follow "t7 spec".

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7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	^{o}C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current (per pin)	I_{pin}	20±0.6	mA
PWM Duty Ratio	D	100	%
LED Light Bar Test Converter	CMO 27-D041745		

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity (CIE 1931)	Red	Rx	$\theta_x=0°$, $\theta_Y=0°$ **CS-2000**	Typ - 0.03	(0.624)	Typ + 0.03	-	(1), (5)
		Ry			(0.346)			
	Green	Gx			(0.335)			
		Gy			(0.604)			
	Blue	Bx			(0.160)			
		By			(0.071)			
	White	Wx			(0.313)			
		Wy			(0.329)			
Center Luminance of White (Center of Screen)		L_C		200	250	-	cd/m^2	(4), (5)
Contrast Ratio		CR		350	500	-	-	(2), (5)
Response Time		T_R	$\theta_x=0°$, $\theta_Y=0°$	-	2	4	ms	(3), (7)
		T_F		-	6	12		
		$T_{GtG\_AVE\_}$		-	-			
White Variation		δW	$\theta_x=0°$, $\theta_Y=0°$	---	---	(1.33)	-	(5), (6)
Viewing Angle	Horizontal	θ_x	CR $\geq$ 5	(90)	(100)	-	Deg.	(1), (5)
	Vertical	θ_Y		(70)	(80)	-		
Viewing Angle	Horizontal	θ_x	CR $\geq$ 10	(80)	(90)	-	Deg.	(1), (5)
	Vertical	θ_Y		(55)	(65)	-		

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Note (1) Definition of Viewing Angle (θx, θy):
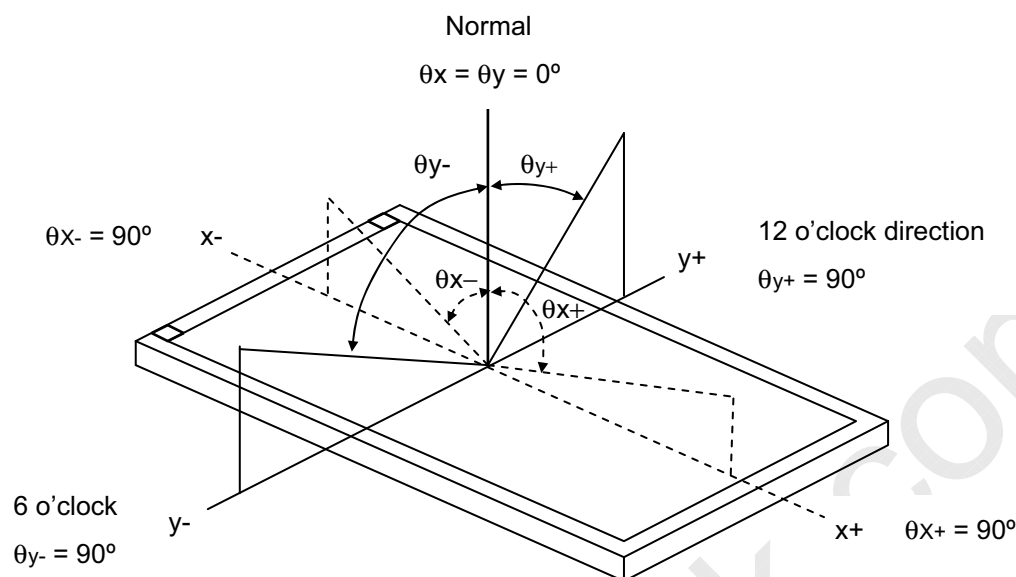
Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0
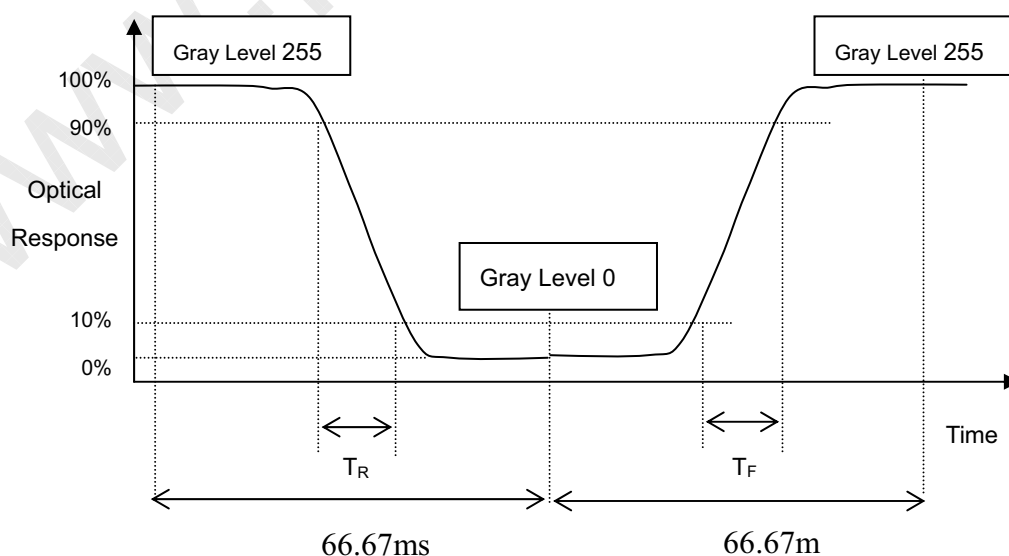
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (1)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):

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Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 255 at center point

$L_C = L (1)$

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 40 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 40 minutes in a windless room.

LCD Module

LCD Panel

USB2000+   CS-2000

Field of View = 2º

Center of the Screen

500 mm

Light Shield Room

(Ambient Luminance < 2 lux)
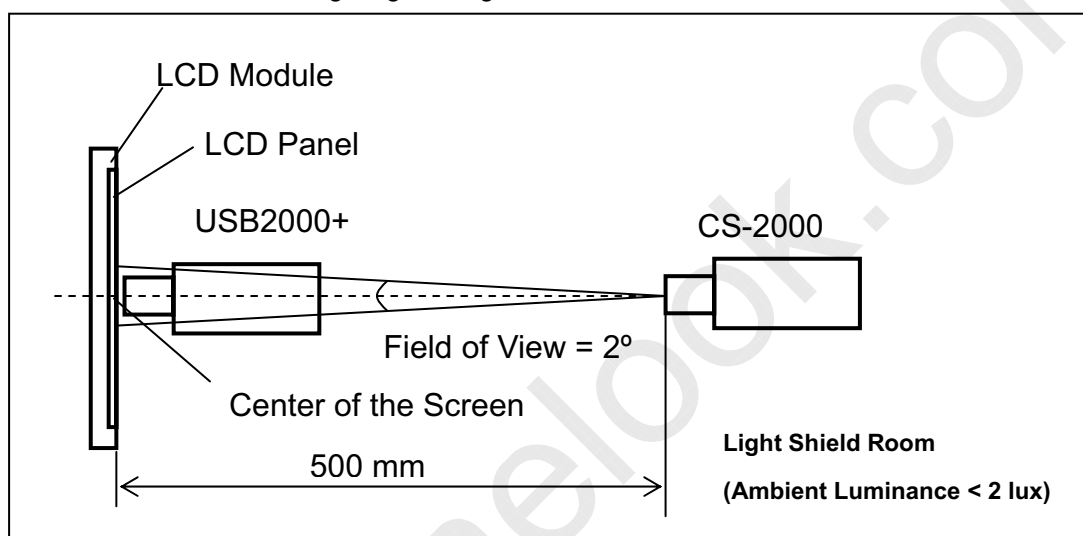
Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

δW = Maximum [L (1), L (2) ……L (4), L (9)] / Minimum [L (1), L (2) …… L (4), L (9)]

Horizontal Line

D

D/10   D/2   9D/10

W/10   ①   ②   ③

Vertical Line   W   W/2   ④   ⑤   ⑥   ⓧ : Test Point

X=1 to 9

9W/10   ⑦   ⑧   ⑨

Active Area

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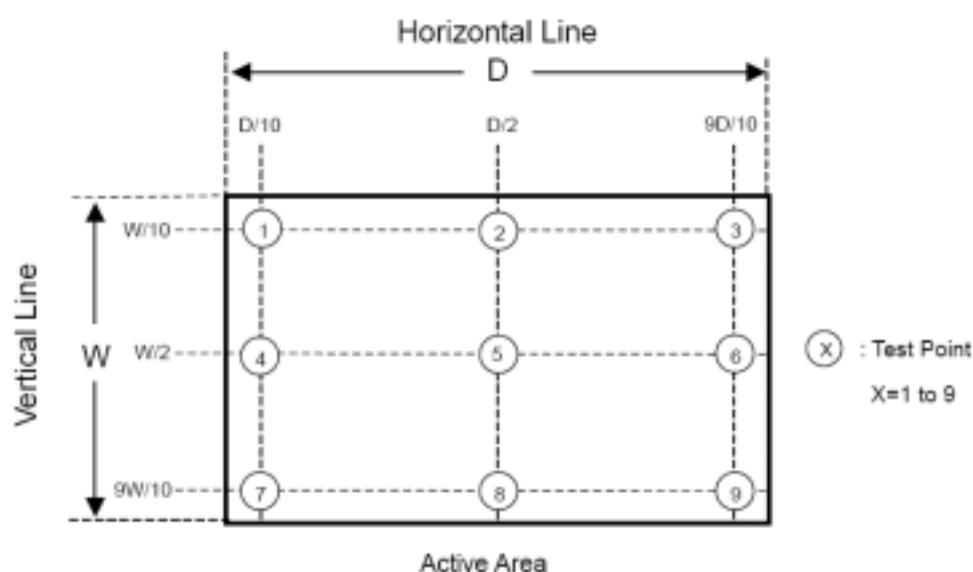
8. PACKAGING

8.1 PACKING SPECIFICATIONS

(1) 12 LCD modules / 1 Box

(2) Box dimensions: 490(L) X 325(W) X 320(H) mm

(3) Weight: approximately 15.7Kg (12 modules per box)

8.2 PACKING METHOD

(1) Carton Packing should have no failure in the following reliability test items.

Test Item	Test Conditions	Note
Vibration	ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	Non Operation
Dropping Test	1 Corner, 3 Edge, 6 Face, ISTA STANDARD	Non Operation

Box Dimensions: 490(L)*325(W)*320(H) mm
Weight: Approx. 15.7 kg (12 module .per. 1box)

Figure. 8-1 Packing method

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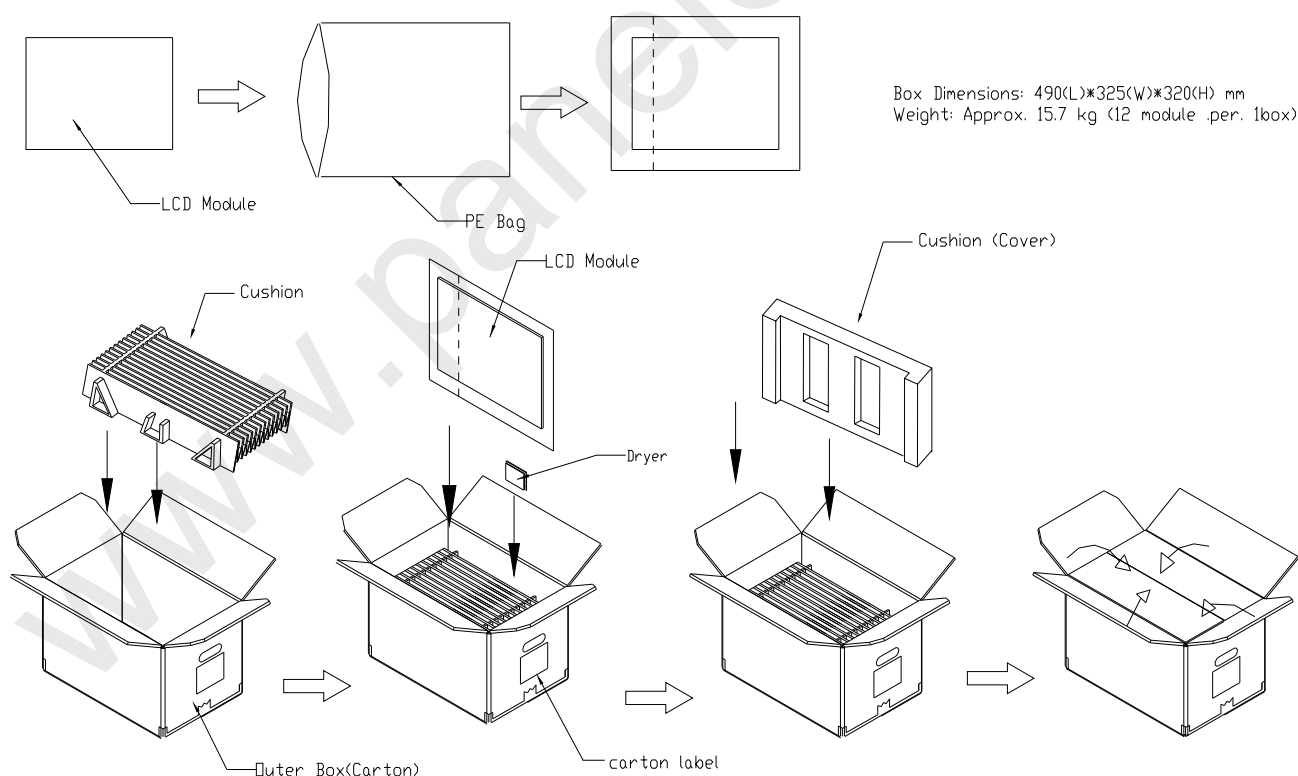
For ocean shipping

Sea / Land Transportation (40ft Container)
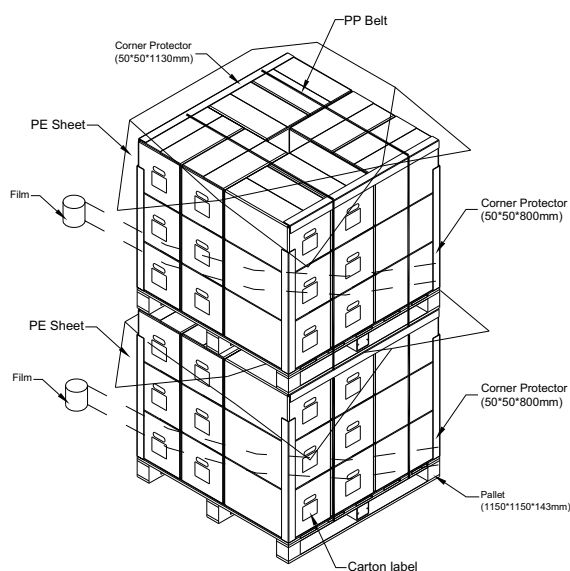
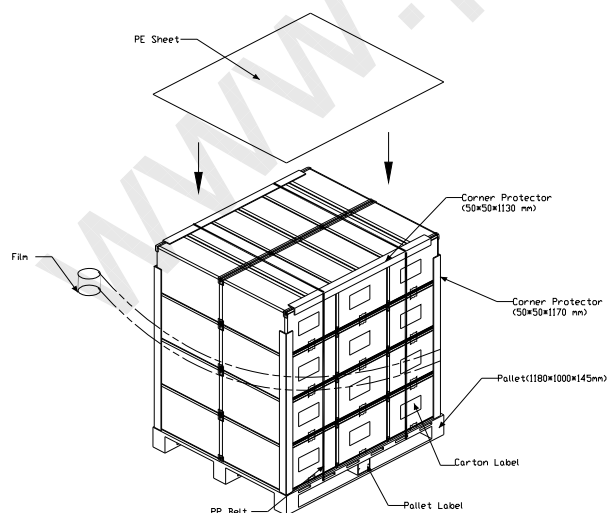**Figure. 8-2 Packing method**

For air transport

Air transportation

Figure. 8-3 Packing method

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9. DEFINITION OF LABELS

9.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.

(a) Model Name: M156B3-LA1

(b) Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

(c) CMO barcode definition:

Serial ID: XX-XX-X-XX-YMD-L-NNNN

Code	Meaning	Description
XX	CMO internal use	-
XX	Revision	Cover all the change
X	CMO internal use	-
YMD	Year, month, day	Year: 0~9, 2001=1, 2002=2, 2003=3…2010=0, 2011=1, 2012=2… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, W, X, Y, exclude I, O, and U.
L	Product line #	Line 1=1, Line 2=2, Line 3=3, …
NNNN	Serial number	Manufacturing sequence of product

(d) Customer's barcode definition:

Serial ID: CM-15B31-X-X-X-XX-L-XX-L-YMD-NNNN

Code	Meaning	Description
CM	Supplier code	CMO=CM
F63A1	Model number	M156B3-LA1=F63A1
X	Revision code	Non ZBD: 1,2,~,8,9 / ZBD: A~Z
X	Source driver IC code	Century=1, CLL=2, Demos=3, Epson=4, Fujitsu=5, Himax=6, Hitachi=7, Hynix=8, LDI=9, Matsushita=A, NEC=B, Novatec=C, OKI=D, Philips=E, Renasas=F, Samsung=G, Sanyo=H, Sharp=I, TI=J, Topro=K, Toshiba=L, Windbond=M
X	Gate driver IC code	
XX	Cell location	Tainan, Taiwan=TN
L	Cell line #	1,2,~,9,A,B,~,Y,Z
XX	Module location	Tainan, Taiwan=TN ; Ningbo China=NP
L	Module line #	1,2,~,9,A,B,~,Y,Z
YMD	Year, month, day	Year: 0~9, 2001=1, 2002=2, 2003=3…2010=0, 2011=1, 2012=2… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, T, U, V
NNNN	Serial number	Manufacturing sequence of product

(e) FAB ID(UL Factory ID):

Region	Factory ID
TWCMO	GEMN
NBCMO	LEOO
NBCME	CANO
NHCMO	CAPG

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10. Reliability Test

Environment test conditions are listed as following table.

Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃ , 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 50℃ , 50%RH , 240hours	
Low Temperature Operation (LTO)	Ta= 0℃ , 240hours	
High Temperature Storage (HTS)	Ta= 60℃ , 240hours	
Low Temperature Storage (LTS)	Ta= -20℃ , 240hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Half-sine Frequency: 10 - 300 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 11 ms Direction : ± X, ± Y, ± Z.(one time for each Axis)	
Thermal Shock Test (TST)	-20℃/30min , 60℃ / 30min , 100 cycles	
On/Off Test	25℃ ,On/10sec , Off /10sec , 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω)	
	Air Discharge: ± 15KV, 150pF(330Ω)	
Altitude Test	Operation:10,000 ft / 24hours Non-Operation:30,000 ft / 24hours	

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11. PRECAUTIONS

11.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.

(4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(6) Do not disassemble the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.

(9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(10) When ambient temperature is lower than 10ºC may reduce the display quality. For example, the response time will become slowly.

11.2 SAFETY PRECAUTIONS

(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the module's end of life, it is not harmful in case of normal operation and storage.

11.3 SAFETY STANDARDS

The LCD module should be certified with safety regulations as follows:

(1) UL60950-1 or updated standard.

(2) IEC60950-1 or updated standard.

11.4. Storage

(1) Do not leave the module in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0℃ to 35℃
And relative humidity of less than 70%

(2) Do not store the TFT – LCD module in direct sunlight

(3) The module should be stored in dark place. It is prohibited to apply sunlight or fluorescent light in storing

11.5. Operation condition guide

(1) The LCD product should be operated under normal condition.

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Normal condition is defined as below :

Temperature : 20±15℃

Humidity: 65±20%

Display pattern : continually changing pattern(Not stationary)

(2) If the product will be used in extreme conditions such as high temperature , high humidity , high altitude , display pattern or operation time etc…It is strongly recommended to contact CMO for application engineering advice . Otherwise , Its reliability and function may not be guaranteed.

11.6 OTHER

When fixed patterns are displayed for a long time, remnant image is likely to occur.

12. MECHANICAL CHARACTERISTICS

[Refer to the next 2 pages]

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DETAIL A
SCALE 4/1

(45)

63.163

90

10.9 ±0.5
5.2 ±0.3
9±0.5

(MAX GAP 0.5mm)

SECTION A-A

SEE DETAIL A

16.5

Data CDF Position
(SI mechanical structure should not touch the positions of Data CDF)

Data CDF Position
(SI mechanical structure should not touch the positions of Data CDF)

363.8 ±0.5
347.532 ±0.3 (OPEN AREA)

Active Area 344.232X193.536

(181.9)
(43.2)
(15.768)
(15.768)
(43.2)

8.134
(148.72)
16.5

196.836 ±0.3 (OPEN AREA)
215.92 ±0.5
9.745

(108.163)

NOTE:
1.OUTLINE TOLERANCE: ±0.5mm
2.I/F CONNECTOR SPEC:093G30-B2001AS,Starconn
3.FFC CONNECTOR Entery 7083K-F12M-00L CMD ND 25-D042447
4.SIDE MOUNT HOLE ROTATIONAL TORQUE MUST BE MAX. 5kgf-cm
5.TITL AND PORTION DISPOSITION TOLERANCE OF DISPLAY AREA
   ARE AS FOLLOWING
   (1) Y-direction : |A-B| <= 1mm
   (2) X-direction : |C-D| <= 1mm

SCALE 5/1

4-M3 USER HLOES
MAX. SCREW LENGTH=4.2mm

63.163
90
(45)
10.9 ±0.5
5.2 ±0.3
9±0.5

TITLE ASSY_MODULE_M156B3-LA1
Approved K.L.LIN
Checked ALAN.LEE
Drawer JARED.CHIEN
Designer JARED.CHIEN
Drawing No. M156240JGA
Part No. TBD
Material TBD
Date 14-Dec-2009 Scale 1:1 Unit:mm
2D REV. /A
3D REV. /1.5+
Sheet 1 / 2 A1
CHI MEI
OPTOELECTRONICS CORP.

Mark Description Date Changed.By Approved.By ECN No. Remark

NOTE:
1.OUTLINE TOLERANCE: ±0.5mm
2.I/F CONNECTOR: SPEC.093G30-B2001A,Starconn
3.FFC CONNECTOR: Entery 7083K-T12N-00L, CMO NO 25-D042447
4.SIDE MOUNT HOLE ROTATIONAL TORQUE MUST BE MAX. 5kgF-cm
5.TTTL AND PORTION DISPOSITION TOLERANCE OF DISPLAY AREA
  ARE AS FOLLOWING
  (1) Y-direction : IA-BI <= 1mm
  (2) X-direction : IC-DI <= 1mm

Al_mylar

PIN1

38.566 ±1
(69.597)
1295 ±1(1st function pin position)
(52.4)
093G30-B2001A.Starconn

TITLE	ASSY_MODULE_M156B3-LA1		
Approved	IKL_LIN	Drawing No.	M1562410GA
Checked	ALAN_LEE	Part No.	TBD
Drawer	JARED_CHIEN	Material	TBD
Designer	JARED_CHIEN	Date	14-Dec-2009	Scale	1:1	Unit:mm

2D REV. /A
3D REV. /L5+
Sheet 2/2 A1

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Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark